

A U.S. Perspective on Particle Physics Issues

Physics Without Borders
XVII^{me} Rencontres de la Vallée D'Aoste
March 10, 2003

Judith Jackson, Fermilab

Here in spirit

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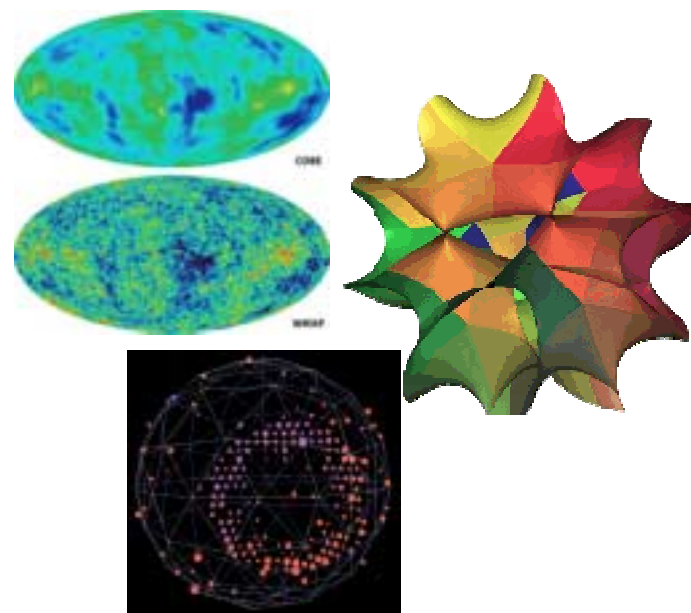
Neil can't be with us, so I'll do my best to speak for Fermilab, SLAC, HEPAP and "Us."



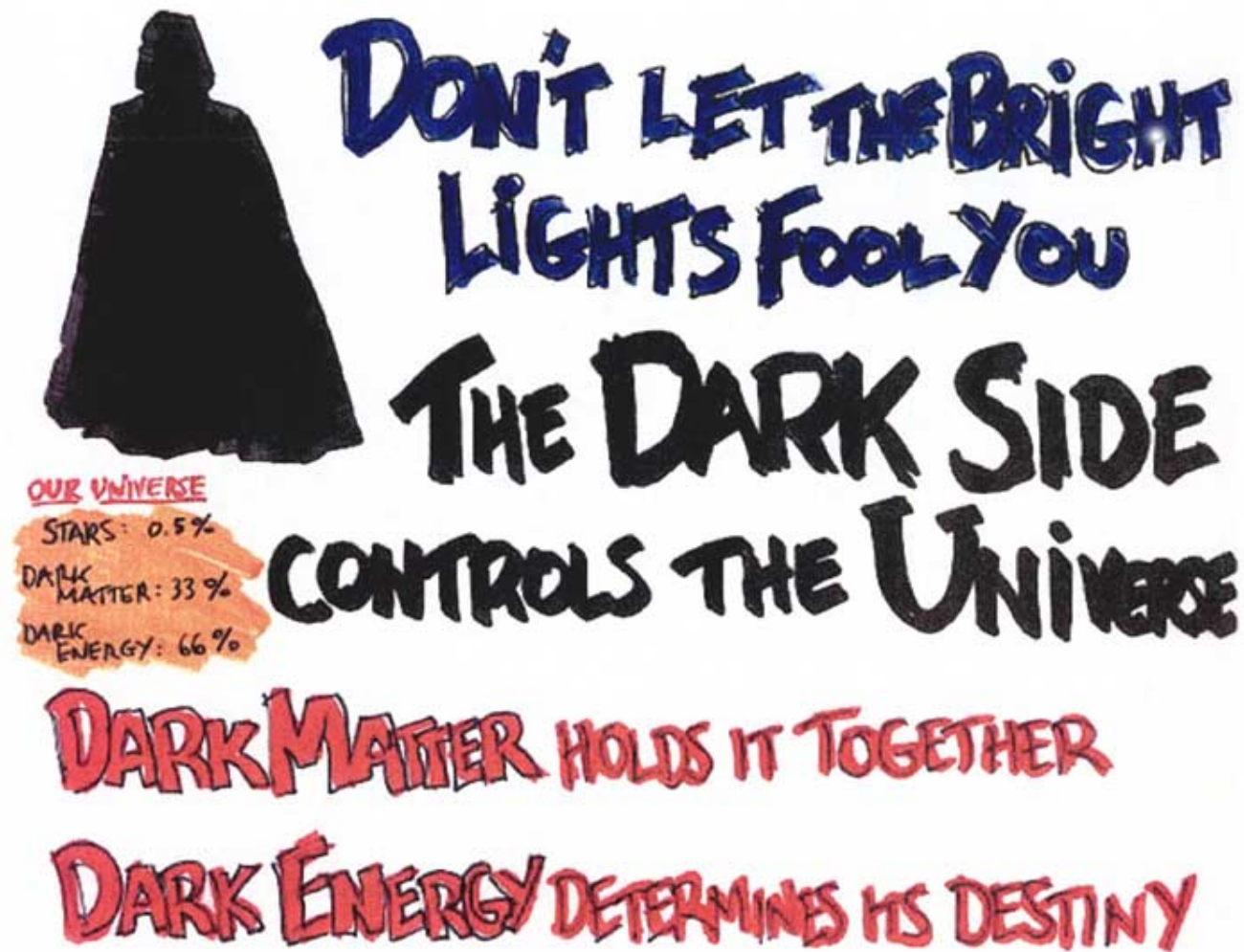
Paradox

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- The science has never been more exciting.
 - Dark matter, dark energy!
 - Extra dimensions!
 - Neutrinos!
 - Antimatter!
 - Cosmic rays!
- The funding picture has seldom been bleaker.



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US Funding Basics

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- Funding sources for US High Energy Physics
 - Department of Energy (DOE), including Fermilab, SLAC, LBL, BNL and universities (90 percent)
 - the National Science Foundation (NSF), including Cornell and universities
- Office of Science is a science-funding agency within the Department of Energy.
 - High energy, nuclear, fusion physics
 - materials science, chemistry, biology, advanced computing...
 - accelerators: Tevatron, PEP-II, RHIC, JLAB, spallation neutron source, and more

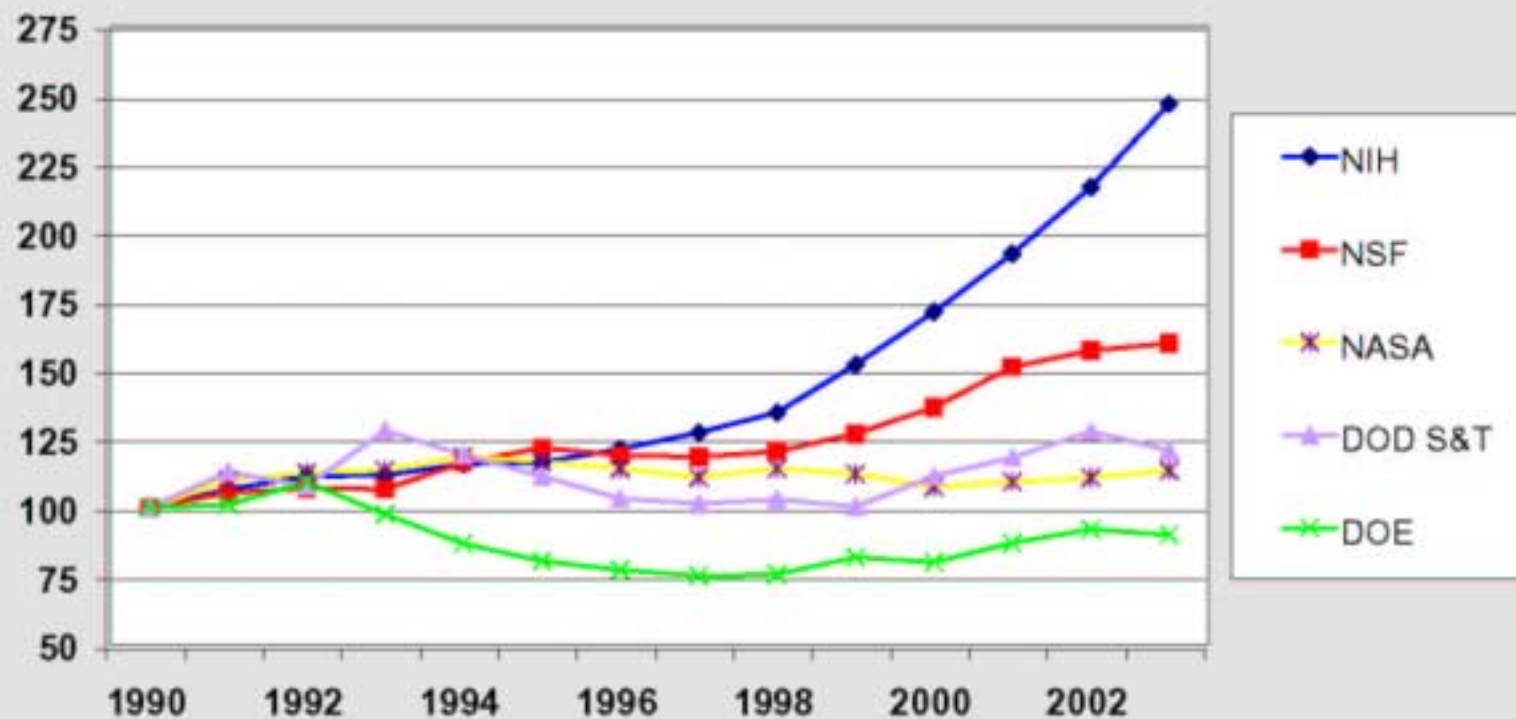
Supporting Agencies for Various Science Areas

Physical Sciences	Mathematics & Computing	Engineering	Life Sciences	Environ. Sciences	R&D Facilities
1. Energy (1,843)	1. Energy (886)	1. NASA (2,240)	1. HHS (14,313)	1. NASA (1,060)	1. Energy (939)
2. NASA (943)	2. DOD (745)	2. DOD (2,065)	2. USDA (1,340)	2. NSF (626)	2. NASA (403)
3. NSF (669)	3. NSF (491)	3. Energy (1,192)	3. DOD (534)	3. Interior (387)	3. DOD (386)
4. DOD (382)	4. HHS (158)	4. NSF (575)	4. VA (283)	4. Commerce (328)	4. NSF (271)
5. HHS (246)	5. Commerce (89)	5. Trans. (395)	5. Energy (274)	5. Energy (313)	5. HHS (227)

** Numbers are FY 2001 Dollars in millions (R&D Facilities is FY 1999) - Source: NSF;
Adapted from DOE Office of Science slide.*

Trends in Federal R&D, FY 1990-2003

selected agencies in constant dollars, FY 1990=100



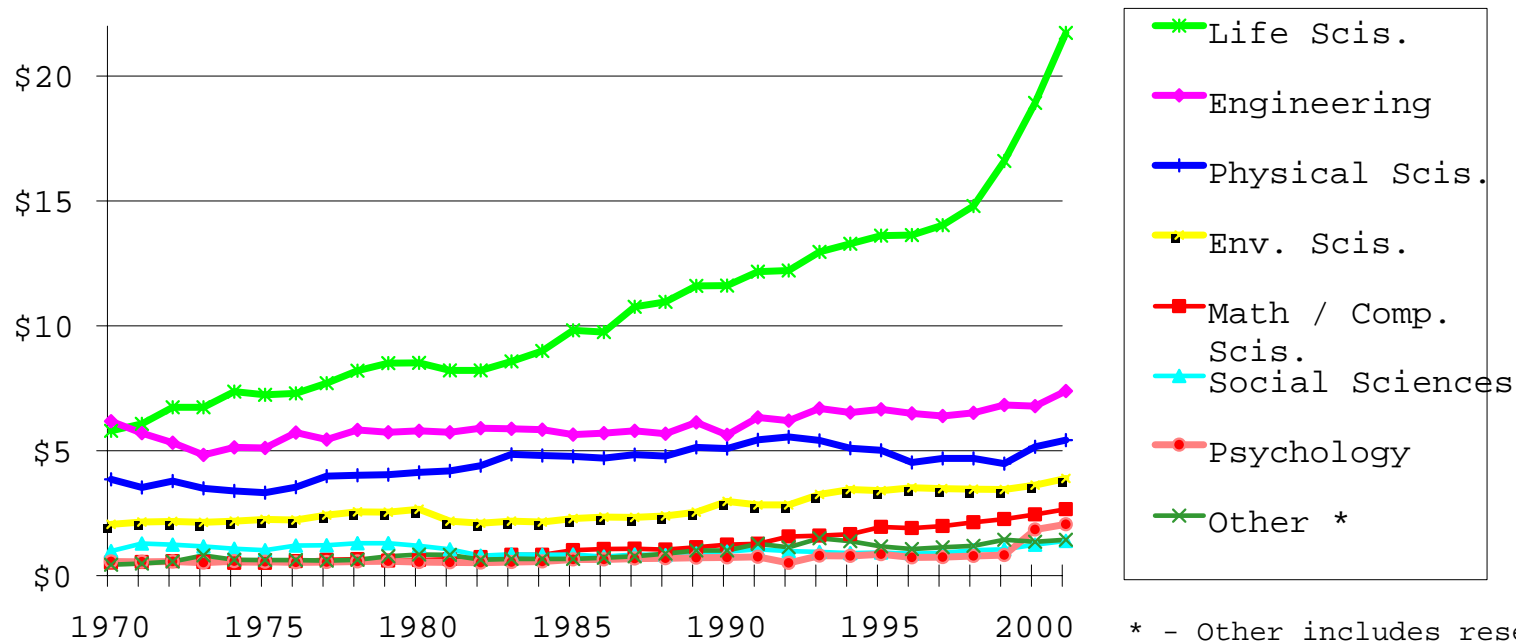
Source: AAAS analyses of R&D in *AAAS Reports VIII-XXVII*. FY 2003 figures are President's request; FY 2002 figures are latest estimates.
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AMERICAN ASSOCIATION FOR THE
ADVANCEMENT OF SCIENCE

Trends in Federal Research by Discipline, FY 1970-2001

obligations in billions of constant FY 2002 dollars



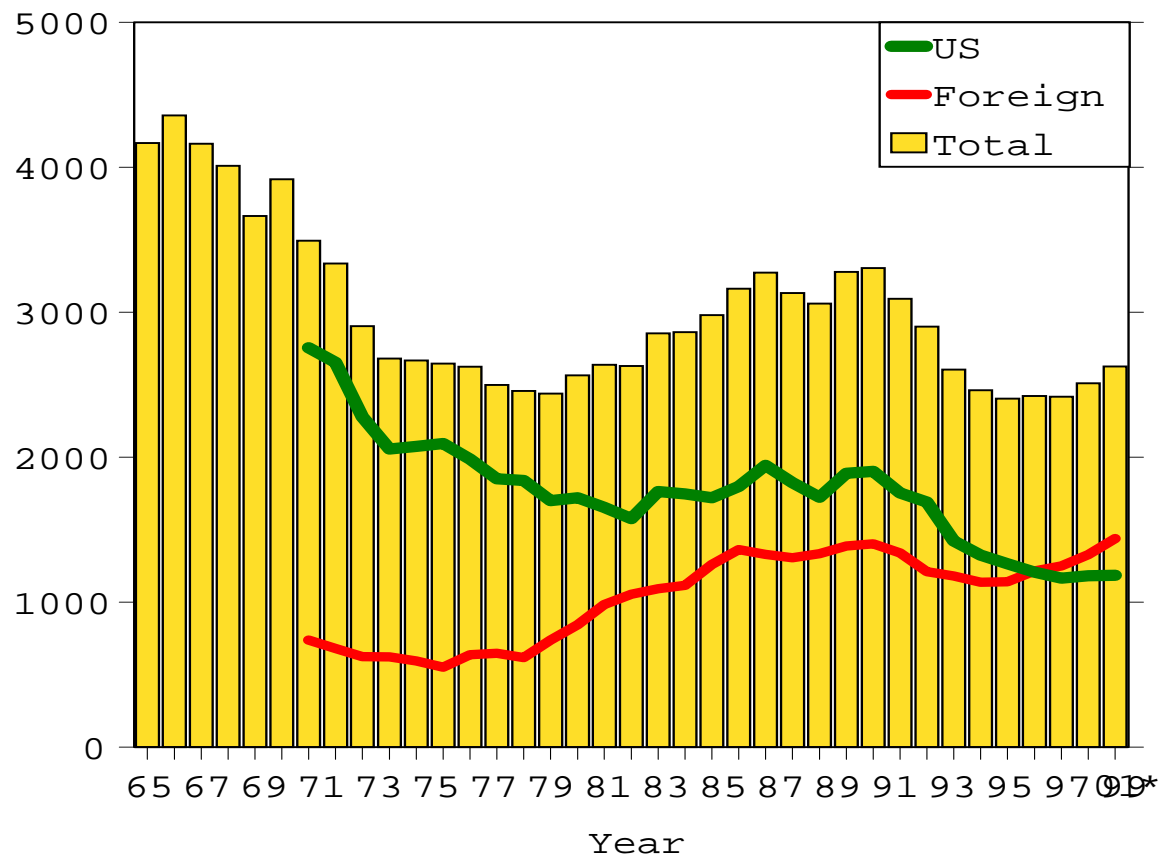
* - Other includes research not classified (includes basic research and applied research; excludes development and R&D facilities)

Source: National Science Foundation, Federal Funds for Research and Development FY 2000, 2001, and 2002, FY 2001 data are preliminary. Constant-dollar conversions based on OMB's GDP deflators. APRIL '02 © 2002 A

Physics graduate students

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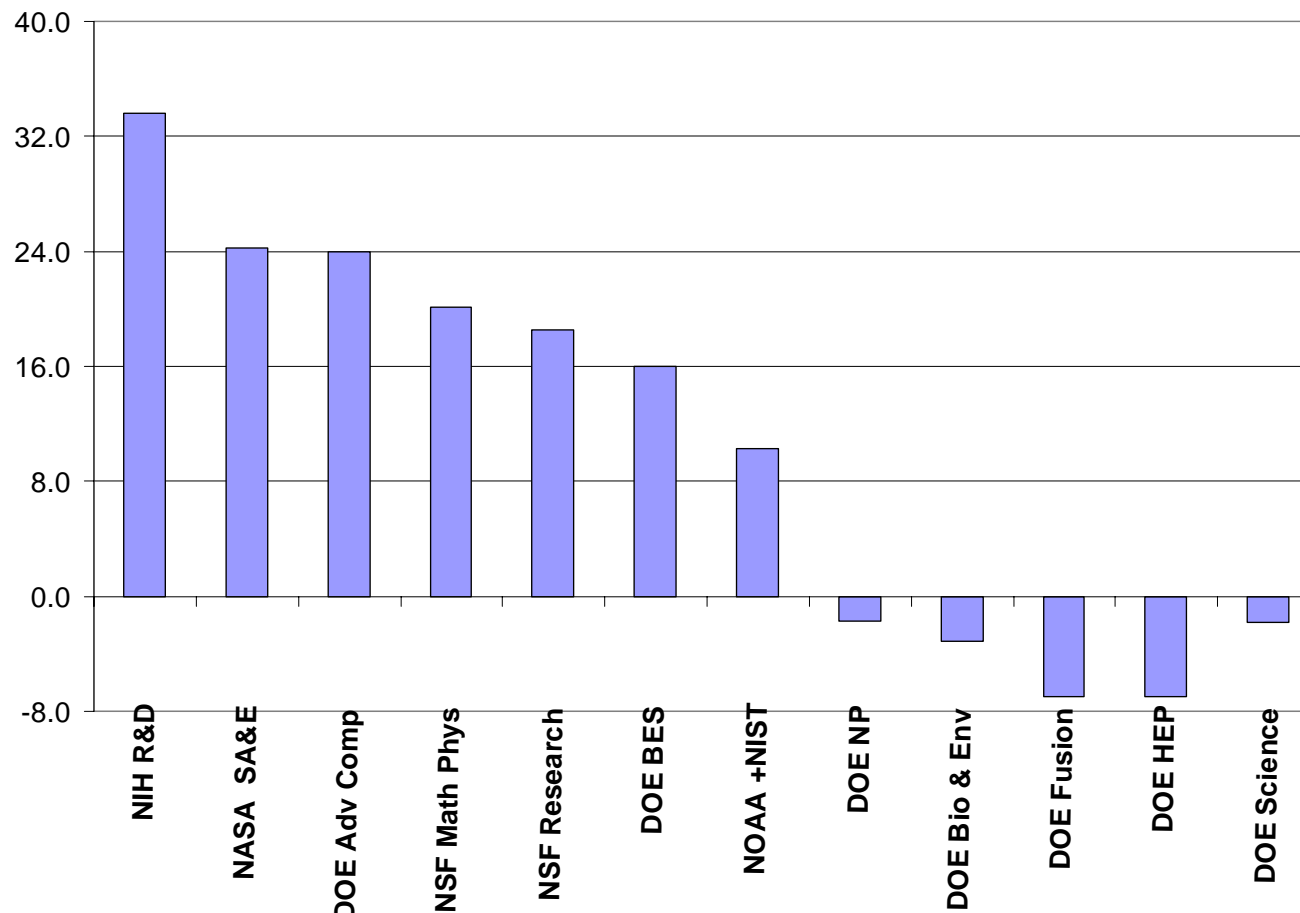
First-year US and foreign graduate physics students, 1965 to 2001.



Science funding 2000-04

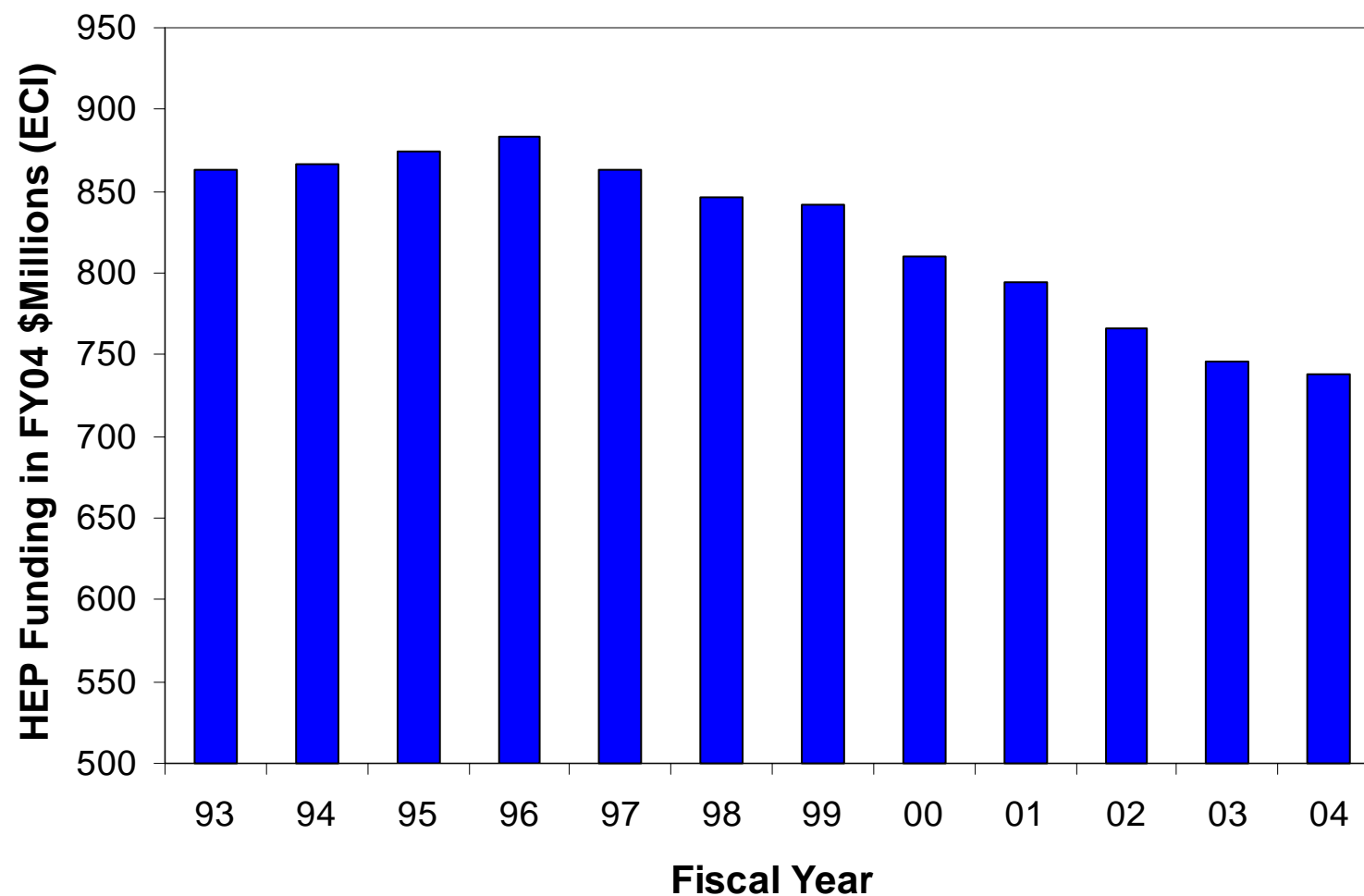
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% Change in funding, 2000-2004, constant dollars



Funding for DOE HEP

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Energy and Science Research Investment Act of 2003 (HR 34):

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- “The DOE’s laboratories have scientific capabilities that are unmatched in typical academic or industrial institutions.
- The facilities at the DOE’s laboratories are invaluable to scientists across disciplines, including those from academia, industry, and government.
- The DOE’s Office of Science programs, in constant dollars, have been flat funded for more than a decade, placing our scientific leadership in jeopardy and limiting the generation of ideas that will enhance our security and drive future economic growth.

HR 34 (continued)

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- Flat and erratic funding has also led to an **underutilization of the facilities** that the United States has invested hundreds of millions of dollars to construct.
- **Higher funding levels for the Office of Science** will provide more opportunities for young Americans to enter the fields of mathematics, engineering, and the physical sciences...”



Biggert Bill (HR 34)

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- Authorization, not appropriations
- Calls for increases of approximately
 - 8 percent for FY 2004.
 - The FY 2007 authorization level would be \$5.31 billion, compared to the current budget (FY 2002) of \$3.28 billion. This is an increase of 61.9%.

Biggert Bill

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- Calls for important administrative changes
 - Under Secretary of Energy Research and Science would be created, with authority over all DOE-funded civilian science at the non weapons national laboratories and research universities.
 - A new Assistant Secretary of Science would replace the current SC "director" position.
 - A Science Advisory Board would be established, consisting of the chairs of DOE's advisory panels.

FY 2005 Initiative for Office of Science

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- DOE officials say that the Department of Energy supports an initiative for SC in the FY 2005 budget.
- House and Senate authorization bills could be passed this year, but it will take a big effort.
 - Biggert and Boehlert authorization bills in House
 - Alexander authorization bill in Senate

Will it help?

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- We don't know, but at least the dialogue has started.
- Finally, decision-makers are talking about the problem of funding for the physical sciences.
- FY2005 could bring change.

Meanwhile....

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- Fermilab Tevatron struggles with Run II luminosity.
- BaBar experiment moves forward.
- Neutrino experiments take shape.
- US-LHC experiments advance.
- Astrophysics assumes a stronger role.

Meanwhile.....

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- Foreign users face new difficulties in US collaborations.
- Other fields of physics show mixed support for HEP—at best.



Plan for the future

- HEPAP Subpanel Plan announced January 2002
- Linear Collider “somewhere in the world.”
- In the US?
- National and International Linear Collider Steering Groups



What's it for?

LEP

Higgs and Supersymmetry

SSC

Higgs and Supersymmetry

Tevatron Run II

Higgs and Supersymmetry

LHC

Higgs and Supersymmetry

Linear Collider

Higgs and....wait a minute!

What's it for?

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- ILCSC, ICFA, US directors have asked communicators to find better ways to talk about the science motivations for a linear collider...
- ...and talking points for particle physics that don't use the term "Standard Model."
- How to support a linear collider without downplaying the role of the LHC?
- Fermilab, SLAC and CERN have begun work. Others needed.

US communication initiatives

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- “Us”
- Common goals, message
- Labs, universities, APS, lobbyists
- Message
 1. Increased support for physical sciences
 2. Excitement of particle physics
 - (...and only after progress on 1 and 2)
 3. Support for a new accelerator

One US voice for particle physics

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- Fermilab-SLAC common publication
- Weekly videoconference of SLAC and Fermilab public affairs staffs
- Joint exhibits, users' efforts

And finally...

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- Growing understanding in the US that we will need one *international* voice for particle physics.
- How to make it work?
- Is there a future for accelerator-based particle physics?
- We have a key role.